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NICKEL EXPOSURE STUDY

Several meetings have been held in Oak Ridge following a proposal from International Nickel (U.S.) Inc. (INCO) representatives to ERDA-ORO to consider the feasibility of conducting an epidemiological study of ORGDP employees who have worked in areas where nickel powder was used or handled. The INCO proposal was made because of a draft proposal from the National Institute of Occupational Safety and Health recommending to the Secretary of Labor a new and much lower OSHA standard on airborne nickel and nickel compounds. The NIOSH proposal would lower the acceptable air concentration for nickel or nickel compounds by a factor of 200, i.e., from 1 mg/cu.m to 5 μg/cu.m. This new standard would cause serious problems in the nickel industry generally and also in operations at ORGDP. The information developed from an epidemiological study of ORGDP nickel workers would be useful in efforts to evaluate the new limits proposed by NIOSH and to determine if it would be reasonable to seek less stringent standards.

The NIOSH proposal is based on the fact that problems have been encountered with some nickel compounds, and in the absence of data to the contrary, all nickel was therefore assumed to be carcinogenic. The draft report recommends epidemiological studies (such as proposed by INCO) for additional verification or contradiction. The NIOSH document contains little or no data on the insoluble forms of nickel (e.g., nickel powder as used at ORGDP) and is based on epidemiological studies made on personnel who worked in nickel ore processing plants where exposures to mixed soluble compounds predominated. The data presented are mostly on people who worked in nickel processing plants 20 or more years ago and are somewhat limited. The new standard, if promulgated, would involve not only the ORGDP barrier manufacturing process but also would seriously affect ERDA activities associated with the welding of nickel-plated pipe and monel, grinding operations, nickel plating and possibly machining operations.

When NIOSH first considered limit changes for nickel, a questionnaire was distributed to the nickel industry and INCO did respond. In addition to responding to NIOSH, INCO attempted to educate NIOSH personnel by conducting visits at their Huntington and Canadian facilities. In these visits, they attempted to show distinctions between nickel processes and to pinpoint the nickel sulphide refining process. This process, generating considerable airborne nickel sulphide admittedly, had caused some carcinogenic problems in the past.

INCO also tried to convince NIOSH personnel on the significance of dose response since at the times previous problems occurred, air burdens were high as compared to present practice. In addition, INCO attempted to point out that the causative agent in the roasting process was not clear since carcinogenic problems were encountered when roasting some ores but not when roasting others. The causative agent could be an impurity. The absence of possible interacting agents at ORGDP led INCO to request a study.

The INCO Huntington plant was built in 1920 and 1921 and is now a rolling mill, melting and fabrication facility. Initially, the plant had a roasting operation - copper-nickel sulphides to oxides to make monel. Some problems were encountered when this process was used. The roasting was in close proximity to other operations and personnel were rotated from job to job. The roasting process was shut down in 1948.

Four years ago, INCO hired an epidemiologist to study Huntington personnel who were on the payroll or who had retired. This study followed personnel through 1974. The personnel were divided into groups, depending on exposure, and death rates were compared to rates in the U.S. population. Of the approximately 2,000 people studied, overall death rates of Huntington employees were about 75% of those expected with deaths from cancer being about 88%. Comparison of death rates in industry with those of the general public is difficult since plant employees generally are healthier due to employment screening and subsequent routine physical examinations. Attempts are being made to compare death rates with those in the local plant area and with areas in West Virginia, Kentucky and Ohio. One problem encountered was that approximately 200 employees who had quit were not included in the study since INCO had lost track of these people. A copy of the INCO study has been provided to the ORGDP medical director.

Experience in other areas of the world is similar. The British Health Ministry recognized problems in the 1930's and, as a result, the Canadian government also started investigations. Falconbridge in Norway also was finding problems. Studies seemed to indicate that hard rock ores with many tramp materials were the cause of the problem; other ores, although sulphur was added in the process, did not seem to have problems. The Russians also have had problems; however, their process differs in that pyrites are added in the refining process. Pyrites have characteristics similar to hard rock ores. The French, who use gypsum to supply sulphur, do not appear to have any problems.

INCO personnel reviewed recent air data taken in the Huntington plant. Since sampling methods are different, comparison to data taken prior to 1973 is difficult. Air levels of 0.3 to 0.5 mg/cu.m are found in the recent data from the Huntington plant. In the City of Huntington, air levels are about 1.2 µg/cu.m. General ambient air data are found to be about 0.03 µg/cu.m.

In the course of the discussion between ERDA-ORO, ORGDP and INCO concerning the proposed epidemiological study, a number of guidelines were defined as follows:

1. The scope of the study would be limited to those personnel exposed to airborne nickel powder.

2. The significance of available data would be evaluated. Area exposure data would be used. Other data would include work histories and medical data.

3. The study would assess the mortality from selected diseases which could be related to nickel powder exposure.

4. The study would be restricted to mortality, but an awareness would be maintained relating to morbidity data. This would permit a morbidity study later.

5. The period covered by the study would be from the start of the barrier manufacturing operation (about 1947) to the present and would include all employees with exposures of six months or more.

The number of personnel required to make the study was discussed. It was agreed that a project manager should be established for overall coordination of the study. An epidemiologist would have to be hired to conduct the study with the ORGDP medical director and the manager of the ORGDP Industrial Hygiene group serving as part-time members of the study team. A computer programmer and statistical support would be needed. Support also would be required from an analytical chemist. In addition, high quality clerical help would be needed to retrieve data from the records. It was agreed that the project manager should have a technical background and would need to have the ability to organize the study and coordinate the effort.

It was estimated that the study would require at least five man-years to complete. The target date for completion of the study would be mid-December 1977.

The timing of the study was discussed. It is expected that the NIOSH proposal will be transmitted to the Department of Labor about March 1977 and some time will be required to consider the recommendations and issue regulations for comment. This would be expected no earlier than late 1977. The one-year schedule for the study, therefore, fits the rule-making process.

Sources of funding were discussed and INCO has agreed to bear 50% of all fund costs of the study with ERDA to bear the remainder. An expenditure of up to a total joint cost of $200,000 has been authorized in support of this study. The ORO-Uranium Enrichment Operations Division, being responsible for ORGDP operations, has agreed to provide the required ERDA funding.

UCCND will take the lead role in overall management of the study and maintain records of all costs and obligations incurred so that INCO can reimburse ERDA for its designated portion of costs.

Locating an epidemiologist for the study was the subject of much discussion. It was initially proposed by UCCND that an epidemiologist be hired to participate in this study. We felt that since Mrs. Edythelena Tompkins, epidemiologist at ORAU, is already acquainted with the ERDA-OR Health and Mortality Study files and will become the responsible epidemiologist for the entire ERDA Health and Mortality Study on August 1, 1977, it would save valuable time and ensure quality work if ORAU were requested to participate. The ERDA contract with Dr. Mancuso and the University of Pittsburgh will terminate on July 31, 1977, and responsibility for continuing the H&MS will be transferred to the Medical and Health Sciences Division, ORAU. Through subsequent discussions with Drs. Lushbaugh and Tompkins, it was determined that they were interested and would like to provide the needed epidemiological assistance; moreover, Dr. Lushbaugh assures us that the additional activity would not interfere with ongoing BER programs at ORAU. This assistance, if approved by you, would be on the basis of cost transfers to ORGDP.

Mrs. Tompkins is now preparing a draft two-phased proposal which addresses first the feasibility of such a study on the ORGDP population and second the epidemiologic questions to which answers should be obtained if a sound evaluation is to be made of the NIOSH proposal. We will forward this proposal to Headquarters upon completion.

In view of the importance of this overall study to the ERDA Uranium Enrichment program, we strongly recommend that ORAU be authorized to provide epidemiological support to UCCND.

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